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Is the event study methodology useful for merger analysis? A comparison of stock market and accounting data

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Is the Event Study Methodology Useful for Merger Analysis? A Comparison of Stock Market and Accounting Data[♣]

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Abstract

This paper presents empirical evidence about the ability of event studies to capture mergers' ex-post profitability as measured by accounting data. We use a sample of large horizontal concentrations during the period 1990-2002 involving 482 firms either as merging firms or competitors, and contrast a measure of the mergers' profitability based on stock market event studies with one based on balance sheet profit data. We show that using a long window around the announcement date (25 or 50 days before the event) increases the ability to capture the ex-post merger effect: the pairwise correlation coefficient is positive and highly significant.

Keywords: Mergers, Merger Control, Event Studies, Ex-post Evaluation

JEL Codes: L4, K21, G34

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1. Introduction

The empirical assessment of merger effects has a deep-rooted tradition in the industrial organization, corporate governance, and finance literature. Scholars have long been interested in understanding the driving forces of this phenomenon as well as how it affects the functioning of corporations and markets.[1] Additionally, the competitive assessment of mergers has a fundamental policy dimension, since merger control has become one of the central tasks for anti-trust authorities worldwide. Yet, the most appropriate empirical approach to achieving such an assessment has been an open and debated issue for decades.

Stock market reactions to merger announcements could help to predict mergers' future profitability if financial markets are efficient. This approach, called the event study methodology, was developed in finance in the 1970s and is broadly accepted in this discipline, notwithstanding its limitations and some caveats on its applicability. Yet, many economists – in particular industrial organization economists – are skeptical about the presumptions of efficient markets and the financial market's ability to correctly anticipate the competitive effects of mergers.[2] Thus, the pioneering efforts of Eckbo (1983) to use this methodology in the antitrust analysis of mergers have not since been widely applied.[3]

A second approach, based on accounting data, has been advanced in the literature to measure merger effects. Following the pioneering work by Dennis Mueller (1980), several studies during the two following decades have tried to assess mergers by comparing the performance of the merging firms with a control group of non-merging firms and using the

[1] See Andrade, Mitchell, and Stafford (2001) and Holmstrom and Kaplan (2001) for an in-depth discussion of the recent literature on mergers.

[2] See Fama (1998) and Shiller (2003) for two opposite views on the efficient market hypothesis.

[3] Duso, Neven, and Röller (2007) thoroughly discuss the pros and contras of the event study methodology, while Duso, Gugler, and Yurtoglu (2007) present an exhaustive discussion of the literature that has used event studies to assess antitrust enforcement. Recently, Aktas et al. (2007) also used this methodology to assess European merger control.

difference between pre- and post-merger profits.[4] Yet, the intense debate following Fisher and McGowan (1983) reflects the profession's skepticism of the use of accounting rates of return as a reliable measure of the economic rate of return and, thus, of a firm's performance.[5] In line with this skepticism, Andrade, Mitchell and Stafford (2001) argue that operating performance studies can also be problematic in assessing the changes in the profitability of parties to an M&A transaction. Caves (1989) points to conflicting results obtained from event studies and operating performance studies and tries to reconcile these two sets of empirical evidence. Hence, the central question arises as to whether these two approaches lead to significantly different conclusions.

This paper builds on our previous extensive work[6] and tries to answer this question by estimating (1) the (ex-ante) announcement effects of mergers on both merging and rival firms by means of an event study, (2) (ex-post) balance sheet profit effects of these mergers on merging and rival firms up to five years post-merger, and (3) by comparing these estimates by correlation and regression analysis.

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[4] See Ravenscraft and Scherer (1987) and Gugler et al. (2003) for the most recent and comprehensive study using this kind of approach.

[5] Grout and Zalewska (2008) provide an extensive discussion of various measures of the rate of return and excessive returns and their use and applicability in competition law. In addition to this general concern, accounting for mergers and acquisitions as well as the use of different accounting rules across countries has also been one of the most controversial financial reporting issues, generating numerous and divergent opinions and interpretations (Aboody et al. 2000). While we see that arbitrary reporting practices would pose a serious limitation to the validity of any paper using accounting data, we believe that systematic differences across countries are less of a concern in our research design, which compares merging and rival firms' profits to firms in the same industry and correlates these with ex-ante measures of a firm's profitability. Unless firms change their reporting systems in unpredictable ways, our methodology will not be subject to a systematic bias caused by different accounting rules in different countries. This is also supported by the results of the various robustness checks based on different counterfactuals, such as similar size or geographical regions, but none changed our results significantly.

[6] See Gugler et al. (2003) for an in-depth study of mergers' effects using accounting data and Duso, Neven, and Röller, (2007) and Duso, Gugler, and Yurtoglu (2006) and (2007) for an analysis of merger effects based on event studies.

Our results indicate that the market seems to correctly anticipate the profit effects when we use long windows spanning 25 or 50 days before the announcement date, as indicated by a positive and significant correlation between the two measures. On the contrary, it seems that short windows might not be able to predict rivals' profits, as the correlation between abnormal returns and ex-post excess profits is, in some cases, even negative and significant. Notice at this point that our analysis does not imply a judgment on what the "right" measure of merger performance is, we just point out under which circumstances measures based on different techniques and data sources lead to similar results, thus enhancing our confidence that, in those cases, both measures might capture the merger's true effect.

Given the inconclusive nature of the debate mentioned above, our results have potentially important policy implications. If ex-ante and ex-post measures of profitability are strongly correlated, then event studies might be used to provide supporting (yet surely not conclusive) evidence in the competitive assessment of mergers. Recent interest by the competition authorities (Beverley, 2007) suggests that even practitioners consider this link to be an important one.

A number of other studies have tried to compare ex-ante previsions through event studies with ex-post realizations. Using different samples of mergers, Ravenscraft and Pascoe (1989), Healy et al. (1992), Kaplan and Weisbach (1992), Schwert (1996), as well as Sirower and O'Byrne (1998) show that ex-ante stock market returns are positively and significantly correlated with ex-post performance. Yet, to the best of our knowledge, no study has attempted to measure the ability of an event study to infer a merger's profitability effect for competitors, which is a novelty of our paper that has been made possible by a very unique dataset.

This paper is organized as follows: Section 2 presents the basic ideas of the two methodologies to measure mergers' effects; Section 3 describes the data and the correlations results; Section 4 concludes.

2. Measuring Profitability

2.1. Event Studies

This methodology is based on the fundamental idea that stock prices represent the discounted value of firms' future stream of profits. Hence, when observing a stock market reaction to the announcement of a particular event (e.g. a merger), the change in the equity value of firms affected by this event (e.g. merging firms and their rivals) can then be taken as a measure of the (discounted) additional profits that they are expected to accrue as a consequence of the event. The main issue is then to identify the right counterfactual, i.e. what would have happened had this event not occurred. The idea of the event study methodology is to use a model – most commonly the market model – to predict this counterfactual.

Under the assumption of efficient markets and rational expectations, the market model predicts that firm *i*'s stock return at time *t* (R_{it}) is proportional to a market return (R_{mt}):

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}, \qquad (1)$$

where ε_{it} is an i.i.d. normally distributed error term.

To study the stock price reaction to the merger's announcements, we first estimate the "normal return" for each firm by using (1) over 240 trading days, starting 60 days prior to the merger's announcement date and using the Scholes-Williams (1977) method. We obtain estimated values for the model's parameters α_i and β_i, which we use to generate the counterfactual, i.e. to predict what firm *i*'s stock price would have been had the merger not

been announced ($\hat{R}_{it}$). For each firm *i*, we then calculate the abnormal return around the merger's announcement day *t* ($AR_{i,t}$) as:

$$AR_{it} = R_{it} - \hat{R}_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}) .$$

Since there might be information leakages, which influenced firm *i*'s return before (or after) the merger announcement, we define the total firm valuation effect of the merger as being the sum of the daily abnormal return within an event window spanning from *m* days before the event to *n* days after it:[7]

$$CAR_{i,m,n} = \sum_{\tau=-m}^{\tau=n} AR_{i,\tau} .$$

We calculate these measures for each of the merging and rival firms.

Given that the aim of our paper is to analyze the ability of the event study methodology to infer the ex-post merger's profitability effect, and because the merger's ex-post profit effects are generally expressed in millions of US dollars (see next section), we also decide to express our ex-ante profitability measures in terms of million US dollars. This is a common approach in the literature, which started with Malatesta (1983) and was followed by many other scholars (e.g. Moeller, Schlingemann and Stulz, 2005, or Mueller and Yurtoglu, 2007).[8] We therefore generate the cumulative abnormal returns in terms of firms' value (*MV_CAR*) by multiplying the CARs by the firms' market values:

$$MV\_CAR_{i,m,n} = MV_{it} * CAR_{i,m,n}$$

where MV_{it} is the market value for firm *i* in time *t*, and $t \in (m,n)$.

[7] The choice of the event window is a much debated issue. While a long window might help to capture important information leakages that affect firms' returns, a shorter window helps to reduce the noise due to the occurrence of other non-merger-related events, which might also affect firms' valuation. In the following analysis we will present the results obtained with different windows and discuss our choices.

[8] It is worth mentioning that both Moeller, Schlingemann and Stulz (2005) and Mueller and Yurtoglu (2007) report negative "cumulative abnormal value changes" either for the whole sample or parts of their samples, even though the corresponding "percentage abnormal change" is positive.

2.2. Ex-Post Profitability

We use the methodology of Gugler et al. (2003) to predict a merger's ex-post profit effects.[9] The method compares reported profit levels post-merger with predicted profit levels in the *absence* of the merger. Also in this case, the central issue is the creation of the right counterfactual. Our counterfactual is the development of profits and total assets of the median firm (in terms of profitability) in the same 3-digit industry (SIC3) as the merging firms or their rivals operate. We used a number of other counterfactuals, such as similar size or geographical regions, but none changed our results significantly.

The projected change in the returns on the acquirer's assets from year *t-1* to *t+n* are defined as: $\Delta_{IG,t-1,t+n} = \frac{\Pi_{IGt+n}}{K_{IGt+n}} - \frac{\Pi_{IGt-1}}{K_{IGt-1}}$, where Π_{IGt+n} are the median firm's (income statement) profits and K_{IDt+n} are the median firm's assets both in the same 3-digit industry of the acquired company in year *t+n*. We define $\Delta_{ID,t-1,t+n}$ for the acquired firm's industry analogously to $\Delta_{IG,t-1,t+n}$. The predicted profits of the combined company *M* in year *t+n* is then: [10]

$$\Pi_{Mt+n}^{predicted} = \Pi_{Gt-1} + \frac{K_{IG\,t+n}}{K_{IG\,t-1}} K_{G\,t-1}\,\Delta_{IGt-1,t+n} + \Pi_{Dt-1} + \frac{K_{ID\,t+n}}{K_{ID\,t-1}} K_{D\,t-1}\,\Delta_{IDt-1,t+n},$$

where Π_{Gt+n} (Π_{Dt}) are the profits and K_{Gt+n} (K_{Dt}) are the assets of the acquiring (acquired) company in year *t+n* (*t*). [11]

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[9] We refer to their paper for a more extensive discussion of the methodology.

[10] The profits of the merged company in year *t+n* are predicted to be the profits of the acquirer in *t-1,* plus the predicted growth in its profits from *t-1* to *t+n*, plus the profits of the acquired firm in *t,* plus the predicted growth in its profits from *t* to *t+n* in the absence of the merger.

[11] As pointed out by Barber and Lyon (1996), when calculating accounting-based operating performance, it is important to condition on prior operating performance because operating performance might be mean reverting. While we do not attempt to directly correct our measures of accounting-based operating performance for mean reversion, we take this into account in the regression analysis that we present in Section 3.

The same logic can be applied to the rivals. In fact, antitrust markets are different from industries based on the SIC classification. The advantage of our database, which is thoroughly discussed in Duso, Neven, and Röller (2007), is that we have information on the merging firms' *effective* rivals in the involved product markets.[12] These firms are not a good counterfactual, since they are affected by the merger just as much as the merging firms are. However, the merger should not strongly impact on the rest of the industry, which makes the 3-digit SIC classification a good counterfactual for the merger, once we exclude the merging and rival firms. We can subsequently get a measure of the projected change in the returns and of the predicted profit for the rivals in absence of the merger, which is something novel in the literature.

Our measure of firm *i*'s merger effect (*i=merging entity* or *rivals*) is then the difference between actual (observed) profits in year *t+n* and the predicted profits:

$$\Delta\Pi_{it+n}^{effect} = \Pi_{it+n}^{actual} - \Pi_{it+n}^{predicted}$$

3. The Data and Correlations

Our original sample consists of 167 large horizontal concentrations that were under antitrust scrutiny by the European Commission (EC) during the period 1990-2002.[13] The definition of the merging firms and the competitors is made according to the Commission's reports, which are freely downloadable from the Commission's webpage.

The use of these reports has the exceptional advantage that it allows us to exploit the carefully done market definition by the Commission's officials and, hence, it enables a fairly

[12] The product market definition, hence the definition of effective competitors, is taken from the reports of the EU commission. All our mergers, in fact, were under antitrust scrutiny of the EU antitrust authority. In the data section we expand on this point.

[13] Our sample – which was developed by Duso, Neven, and Röller (2007) - includes almost all problematic mergers that underwent an in-depth antitrust investigation (phase II) by the European Commission at the end of 2001, and a randomly matched sample of less problematic cases cleared in the first investigation phase (phase I), which ran up to June 2002. See Duso, Neven, and Röller (2007) and Duso, Gugler, and Yurtoglu (2006) for a detailed description of the data and the European merger control regime.

precise assessment of the *effective* rivals to the merging entities. This is particularly useful since it also allows us to generate a counterfactual for the rivals, by using all other firms in the same SIC3 industry that have not been either merging firms or direct competitors in the product market. Indeed, while some firms in the same industry will certainly be rivals, other firms are likely to be customers and/or suppliers to the merging firms, and still others may have no relation to the merging parties.

Clearly, drawing mergers from those transactions under antitrust scrutiny in Europe leads to European firms being over-proportionally represented in our sample. Yet, these transactions have a clear international dimension, since they very often affect not only European but also world markets. Indeed, our sample reflects this diversity as more than one-fourth of the involved firms are listed in either the US or Canada, and 15% come from the rest of the world. Therefore, we can consider our sample as being representative of the global environment for merger and acquisitions, even if it is clearly biased towards big European corporations.

For all the identified firms, we first defined the merger's announcement date by means of Dow Jones interactive, a customizable business news and research product that integrates content from newspapers, newswires, journals, research reports and web sites. We chose as the announcement date the first day where rumors about the merger appeared in the press.[14] We then collected stock market data by using Datastream. We were able to identify 544 *different* firms either as merging or as rival firms. Since some firms participated in several mergers either as merging entity or rivals, we indeed have 955 observations at the

[14] To check the reliability of this information, we made the extra effort of obtaining the announcement dates ("original data announced") from the SDC database (Thomson Reuters) for a large subsample of our 167 events. A comparison of these two different data sources reveals a strong overlap: for most of the events the event dates coincide and for a small fraction of them the differences between the two event dates was minimal. Thus, we are fairly confident that the use of the DJI database does not introduce a systematic bias into our results.

firm level. Finally, we matched this data with balance sheet data from the Global Vantage/Compustat databases. Due to missing data for relevant variables and the inability to match firm names, the number of observations was substantially reduced to 596.

In order to have a comparable sample, we have kept only those firms for which we were able to predict the ex-post profit effects at least two years after the merger. Hence, the final sample consists of 114 mergers involving 155 merging firms (85 acquirers and 70 targets) and 327 rivals. Since we are only interested in comparing the two profitability measures for each single entity, this sample selection is not a major concern. Moreover, the firms in our sample tend to be the larger ones and the mergers that remain are the big transactions that make it in the press. Precisely for these mergers, it would be useful to understand how reliable the two profitability measures are, since these are generally the most problematic ones from an antitrust policy perspective.

Table 1 reports the means, medians and standard deviations for the *MV_CAR*s based on different event windows,[15] while table 2 reports the profitability effects ($\Delta\Pi_{i,t+n}^{effect}$) for merging firms and rivals up to five years after the merger.[16] Some similarities and some differences between the results obtained with the two methodologies already appear from these aggregate statistics. For the merging firms, the means of the *MV_CAR*s are negative

[15] For the short window (5 days), we based our choice on a standard practice in the literature (e.g. Andrade, Mitchell, and Stafford, 2001). Results with an even shorter window (3 days) are very similar. For the long windows, we were guided by the peculiarity of our sample. We discussed this issue in depth on a companion paper (see Duso, Gugler, and Yurtoglu, 2006 p. 20 and Figure 3) where we show the existence of an average upward drift of abnormal returns beginning some 50 days before the announcement of the merger for merging firms and rivals.

[16] If we express the *MV_CAR*s reported in table 1 in percentage terms (*CAR*s), we obtain the following picture: targets wrap most of the benefits of the merger with positive and significant abnormal returns in the range between +3.6% and +5%, depending on the window. Acquirers at best break even with positive but not significant abnormal returns ranging between 0% and +0.7%, depending on the window. The overall effect for merging firms is positive and partially significant (between 0.1% and 0.96%) and it is positive and significant for the rivals (between 0.3% and 1.1%). These results are very much comparable with those reported in the literature (e.g., Campa and Hernando, 2004; Goergen and Renneboog, 2004; and Atkas et al. 2007).

while the means of the profit effects are positive. However, both the median *MV_CAR*s and the median ex-post effect are positive. In general, the differences between *MV_CAR*s and ex-post profit effects seem substantial: Clearly, the *MV_CAR*s underestimate on average the ex-post profit effects of the merger. Finally, the variability of the measures based on stock data is much higher as witnessed by the larger standard deviation.

Looking at rivals, the picture is quite different. In this case, both the means and the medians of the *MV_CAR*s (with the possible exception of *MV_CAR* (2,2), which is close to zero) have the same positive sign as the ex-post profit measures. Also, the magnitudes of the average effects obtained with stock market data and accounting data are quite comparable, while the median *MV_CAR*s again seem to underestimate the median ex-post profit effects.

Up until now, we have discussed the aggregate picture, yet we are much more interested in comparing, for each firm, how close the results obtained with the two methodologies are. We therefore perform a pairwise correlation analysis, which is reported in table 3.[17] For merging firms, the correlation coefficients between *MV_CAR*(50,5) and merger profit effects are always positive and mostly significant. Moreover, the profit effects four years after the merger seem to be very well captured by all measures of abnormal returns. Yet, *MV_CAR*s based on long windows seem to perform better in terms of correlation with accounting-based operating performance measures. The picture is similar, or even reinforced, for rivals: *MV_CAR*s based on short windows produce very misleading results, since they are *negatively* and significantly correlated to the profit effects. Again, for

[17] Whether both variables of interest (*MV_CAR* and $\Delta\Pi_{i,t+n}^{effect}$) are measured in millions of US dollars or expressed in percentage terms (in the case of *CAR*s, as a fraction of the market value and, in the case of profitability, as a fraction of firm size such as total assets) does not lead to qualitatively different results for the correlation analysis.

rivals the *MV_CAR*s based on long windows (30 or 55 days) also seem to capture well the long-term merger profit effects.[18]

The next step of our analysis consists of looking at whether there are differences in the financial markets response for pro- or anti-competitive mergers in terms of ability to predict the post-merger profitability performance. Accordingly, we partition the sample following Duso, Neven, and Röller (2007). We define a merger as anti-competitive if the post-merger rivals' profitability – as measured by the weighted sum of the *MV_CAR*s of all rivals for each merger in the (25,5) window – increases.[19] Table 4 reports the results for the two samples of pro- and anti-competitive mergers. Interestingly, the market correctly anticipates anti-competitive mergers when using long pre-announcement periods (25 to 50 days), as witnessed by the large and significant correlation coefficients for rivals up to five years post merger. Also, the market predicts merging firms' rents stemming from increased efficiencies (pro-competitive mergers) more precisely than those stemming from an increase in market power (anti-competitive mergers).

Finally, we look at whether the found correlations are robust to the use of regression analysis, especially with the aim of correcting for possible mean reversion of profits (see Barber and Lyon, 1996). Table 5 presents regressions of the MV_CARs for various event windows on profit effects of the merger five years after the deals ($\Delta\Pi_{i,t+5}^{effect}$) and profits of the firms lagged by one period ($\Pi_{i,t-1}$). All variables are in million US dollars. Notice that the causality runs from the profit effects to the MV_CARs: assuming efficient capital markets,

[18] Similar results in terms of sign and significance can be obtained restricting the sample to those mergers for which we have non-missing observations also for the profitability effects up to 5 years after the merger.

[19] The argument was initially put forward by Eckbo (1983). While post-merger profit increases for the merging firms can be due to two effects – the market power effect but also desirable efficiency gains – profit increases of rival firms unambiguously must result from the post-merger increase in market power. Duso, Neven, and Röller (2007) provide a formal derivation of the correspondence between an increase in rivals' profit and a decrease in consumers' surplus.

the market should anticipate the subsequent profit effects of the mergers and, accordingly, change the current stock price. One period-lagged-profits is included to control for its possible mean reversion.[20]

For merging firms, all coefficients on $\Delta\Pi_{i,t+5}^{effect}$ are positive, however none are significant. Mean reversion in profits does not appear to materially impact our results, since only one coefficient is significant at the 10% level (see the regression for MV_CAR(50,5) and pro-competitive mergers).

As previously seen in the correlation analysis, the most significant results are obtained for rivals and, in particular, in anti-competitive mergers. The coefficient using MV_CAR(50,5), the longest window, is 1.05 and significant at the 1% level. For these mergers, every million US dollars in subsequent profit effects over five years is translated into an equivalent amount of market value now. Again, mean reversion of profits does not appear to materially impact our results, since only one coefficient is negative and significant (again for pro-competitive mergers for MV_CAR(25,5)).

To sum up, the results using regression analysis are consistent with the results using correlation coefficients. In particular, an event study of stock returns best uncovers anti-competitive effects due to a merger when looking at appropriately defined rivals and using a reasonably long window before the merger – in our case, 50 days.

[20] The literature that tries to explain the size of the abnormal returns suggests the use of some firm-specific – e.g. size – and transaction-specific – e.g. form of payment – control variables. Indeed, several empirical studies provide evidence (see the survey by Mueller, 2003) that post-merger cumulative returns are lower for mergers and acquisitions financed through exchanges of shares than for those financed with cash. It is, however, worth mentioning that our point is to provide evidence of the correlation between two measures of profitability: one ex-ante based on stock price data and one ex-post based on balance sheet data. While the use of such controls could potentially allow us to analyze different dimensions of heterogeneity in our sample, it is very likely that these factors influence both abnormal returns and profit effects in the same direction and hence do not bias our results in Tables 4 and 5.

4. Conclusions

The assessment of the competitive effects of large mergers is one of the pillars of anti-trust policy worldwide and has, therefore, a very important policy dimension. Unfortunately, these effects are not observed at the time when the authority is making its decision to allow or block the merger, or to let the merger through with remedies.

In this paper we review the two main methodologies used in the literature during the last 30 years to assess merger effects. The first methodology is based on the stock market reactions to the merger announcement and it represents an ex-ante analysis, which could in principle help to predict the future profitability, since financial markets are supposed to be forward-looking. The second methodology is based on accounting data and it embodies an ex-post assessment. The development in profits of the involved firms several years after the merger is compared to that of a counterfactual, which is defined to be the median firm in the same SIC3 industry.

We apply these two methodologies to a sample of big mergers that underwent the antitrust scrutiny of the European Commission in the period 1990-2001. These are the big transactions, which significantly affect the functioning of product markets and, therefore, are particularly relevant from the antitrust policy perspective. Unlike the previous literature, we can also assess the merger effects for rival firms, by exploiting the careful market definition made by the Commission's experts to have an accurate characterization of the merging firms' *effective* competitors in the product market.

We establish empirical evidence that the event study methodology might be useful for the ex-ante competitive analysis of mergers. In particular, we show that abnormal returns and the ex-post profitability of mergers are positively and significantly correlated for merging firms and, partially, also for their competitors. This is particularly true when using long pre-announcement event windows. Moreover, the event study methodology seems to be particularly useful for identifying and measuring the rivals' post-merger profits stemming

from anti-competitive rents and the merging firms' post-merger profits stemming from enhanced efficiency.

References

Aboody, D., R. Kasznik and M. Williams, 2000, Purchase versus Pooling in Stock-for-Stock Acquisitions: Why do Firms Care?, *Journal of Accounting and Economics*, 29, 261-286

Aktas, N., E. de Bodt and R. Roll (2007), "European M&A Regulation is Protectionist," *The Economic Journal*, 117, 1096-1121.

Andrade, G., M. Mitchell, E. Stafford (2001), "New evidence and perspective on mergers," *Journal of Economic Perspective*, 15, 103-120.

Barber B. M. and J. D. Lyon, (1996), "Detecting abnormal operating performance: The empirical power and specification test statistics," *Journal of Financial Economics*, 41, 359-399.

Beverley, L. (2007), "Stock Market Event Studies and Competition Commission Inquiries," Competition Commission: (http://www.competition-commission.org.uk/our_role/analysis/topics.htm).

Caves, R. E., (1989), "Mergers, takeovers, and economic efficiency: Foresight vs. hindsight", *International Journal of Industrial Organization*, 7, 151-174.

Duso T., D. Neven, and L.-H. Röller (2007), "The political economy of European Merger Control," *The Journal of Law and Economics*, 50, 3, 455-489.

Duso, T., K. Gugler, and B. Yurtoglu (2006), "How effective is European Merger Control?", WZB Discussion paper SP II 2006-12.

Duso, T., K. Gugler, and B. Yurtoglu (2007), "EU merger remedies: An empirical assessment", in J. Stennek and V. Goshal Eds., *The Political Economy of Antitrust*, North Holland, 302-348.

Eckbo, B. E. (1983), "Horizontal mergers, collusion, and stockholder wealth", *Journal of Financial Economics*, 11, 241-273.

Fama E. (1998), "Market efficiency, long-term returns, and behavioral finance," *Journal of Financial Economics*, 49, 283-306.

Fisher, F.M., McGowan, J.J. (1983), "On the Misuse of Accounting Rate of Return to Inter Monopoly Profits," *American Economic Review*, 73, 82–97.

Goergen, M. and L. Renneboog (2004), "Shareholder Wealth Effects of European Domestic and Cross-border Takeover Bids", *European Financial Management*, 10 (1), 9-45.

Grout P. A. and A. Zalewska, (2007), "Measuring the rate of return for competition law," *Journal of Competition Law and Economics*, 4, 155-176.

Gugler, K., D.C. Mueller, B. B. Yurtoglu, and C. Zulehner (2003), "The effects of mergers: An international comparison", *International Journal of Industrial Organization*, 21, 625-653.

Healy, P., K. Palepu; and R. Ruback (1992), "Does corporate performance improve after mergers?" *Journal of Financial Economics*, 31, 135-175.

Holstrom B. and Kaplan S. (2001), "Corporate governance and merger activity in the United States: Making sense of the 1980s and 1990s," *Journal of Economic Perspective*, 15, 121-144.

Kaplan, S. and M. Weisbach (1992), "The success of acquisitions: evidence from divestitures", *Journal of Finance*, 47, 107-138.

Malatesta, P. (1983), "The wealth effect of merger activity and the objective function of merging firms," *Journal of Financial Economics* 11, 155-182.

Moeller S. B., F. P. Schlingemann, and R. M. Stulz (2005), "Wealth destruction on a massive scale: A study of acquiring firm returns in the merger wave of the late 1990s," *Journal of Finance* 60, 757-782.

Mueller, D.C. (1980), *The Determinants and Effects of Mergers: An International Comparison*. Oelgeschlager, Gunn & Hain, Cambridge, MA.

Mueller, D.C. (2003), "The Finance Literature on Mergers: A Critical Survey," in M. Waterson (ed.), *Competition, Monopoly and Corporate Governance, Essays in Honour of Keith Cowling*, Cheltenham: Edward Elgar, 161-205.

Mueller D. C. and B. B. Yurtoglu (2007), "Corporate governance and the returns to acquiring firms' shareholders," *Managerial and Decision Economics* 28 (8), 879 – 896.

Ravenscraft D. and F. M. Scherer,(1987), "Life after takeovers," *Journal of Industrial Economics*, 36, 147-156.

Ravenscraft, D. and G. Pascoe (1989), "Can the stock market predict merger success?", mimeo, University of North Carolina Centre for Economics Studies, Bureau of the Census

Schwert, W. (1996), "Markup pricing in mergers and acquisitions", *Journal of Financial Economics*, 41, 153-192.

Shiller Robert J. (2003), "From efficient markets theory to behavioral finance," *The Journal of Economic Perspectives*, 17, 1, 83-104.

Sirower, M. and S. O'Byrne (1998), "The measurement of post-acquisition performance: towards a value-based benchmarking methodology", *Journal of Applied Corporate Finance*, 11, 107-121.

Table 1: Preliminary Statistics - Abnormal Returns

	MV_CAR(2,2)	MV_CAR(5,5)	MV_CAR(25,5)	MV_CAR(50,5)
		ACQUIRERS		
Mean	-185.566	-439.573	-68.127	-412.514
Median	1.858	0.142	9.085	52.108
St. Dev.	1289.897	2104.995	2616.232	3743.657
Obs.	84	84	84	84
		TARGETS		
Mean	66.55704	67.614	104.041	82.797
Median	13.02516	14.399	12.505	42.388
St. Dev.	1367.39	1597.184	3058.679	3133.289
Obs.	70	70	70	70
		MERGING FIRMS		
Mean	-68.752	-192.601	-86.019	-165.981
Median	9.229	11.7179	2.359	29.742
St. Dev.	1293.746	1545.192	2912.732	3467.705
Obs.	114	114	114	114
		RIVALS		
Mean	27.581	27.103	35.571	141.600
Median	-0.571	6.373	5.666	4.528
St. Dev.	944.624	1433.983	2315.953	2913.687
Obs.	327	327	327	327

Notes: All values are expressed in Million US$. The *MV_CAR(m,n)* variables represent the cumulative abnormal returns in terms of market value over the window spanning from *m* days before the event to *n* days after the event.

Table 2: Preliminary Statistics - Profit Effects

	$\Delta\Pi^{effect}_{M,t+1}$	$\Delta\Pi^{effect}_{M,t+2}$	$\Delta\Pi^{effect}_{M,t+3}$	$\Delta\Pi^{effect}_{M,t+4}$	$\Delta\Pi^{effect}_{M,t+5}$
			MERGING FIRMS		
Mean	-165.981	159.908	204.547	454.1948	467.3696
Median	62.260	103.521	108.986	203.217	202.620
St. Dev.	3467.705	2170.974	1545.483	1891.783	944.4786
Obs.	132	132	101	86	66
			RIVALS		
Mean	141.6003	31.88484	203.1284	334.7082	422.7895
Median	69.256	53.328	74.230	103.467	242.653
St. Dev.	2913.687	2564.891	1754.104	1669.766	1284.532
Obs.	327	327	221	174	143

Notes: All values are expressed in Million US$. The $\Delta\Pi^{effect}_{i,t+n}$ variables represent the aggregated profit change from one year before the merger to *n* years after the merger if compared to the median firm in the same SIC3 industry.

Table 3: Pair wise Correlations: All Mergers

	MERGING FIRMS				RIVALS			
	MV_CAR(2,2)	**MV_CAR(5,5)**	**MV_CAR(25,5)**	**MV_CAR(50,5)**	**MV_CAR(2,2)**	**MV_CAR(5,5)**	**MV_CAR(25,5)**	**MV_CAR(50,5)**
$\Delta\Pi^{effect}_{i,t+1}$	0.0144	-0.0357	0.1274	**0.1643**	**0.0953**	-0.0662	0.0690	**0.1648**
	0.8598	0.6599	0.1131	**0.0411****	**0.0571****	0.1878	0.1703	**0.0010*****
$\Delta\Pi^{effect}_{i,t+2}$	0.1281	-0.0537	0.1289	**0.2031**	**-0.1488**	-0.0752	-0.0133	0.0611
	0.1546	0.5519	0.1488	**0.0225****	**0.0082*****	0.1855	0.8150	0.2814
$\Delta\Pi^{effect}_{i,t+3}$	0.0013	0.0210	0.2022	**0.2096**	0.0024	-0.0983	0.0856	0.0617
	0.9900	0.8375	0.0448	**0.0373****	0.9715	0.1462	0.2057	0.3647
$\Delta\Pi^{effect}_{i,t+4}$	**0.5408**	0.0966	0.1601	**0.4778**	**-0.1556**	-0.0462	**0.1802**	0.1818
	0.0000***	0.3848	0.1459	**0.0000*****	**0.0415****	0.5474	**0.0180****	0.2862
$\Delta\Pi^{effect}_{i,t+5}$	**0.2882**	0.1894	0.1444	0.2926	**-0.1770**	0.0615	**0.4556**	**0.1837**
	0.0199**	0.1309	0.2511	0.4630	**0.0364****	0.4704	**0.0000*****	**0.0298****

Notes: We report pair wise correlation coefficients (first row) as well as p-values (second row).***, **, * represent significance at the 1%, 5%, and 10% level respectively.

Table 4: Pairwise Correlations: Mergers Split into Pro and Anticompetitive

MERGING FIRMS

	PROCOMPETITIVE				**ANTICOMPETITIVE**			
	MV_CAR(2,2)	**MV_CAR(5,5)**	**MV_CAR(25,5)**	**MV_CAR(50,5)**	**MV_CAR(2,2)**	**MV_CAR(5,5)**	**MV_CAR(25,5)**	**MV_CAR(50,5)**
$\Delta\Pi^{effect}_{i,t+1}$	0.0434	0.0355	0.1252	0.1732	-0.0254	-0.1132	0.1601	0.1697
	0.7135	0.7639	0.2810	0.1401	0.8243	0.3175	0.1560	0.1299
$\Delta\Pi^{effect}_{i,t+2}$	**0.2716**	0.0655	0.1669	0.3442	0.0042	-0.1626	0.1104	0.1115
	0.0286**	0.6040	0.1771	0.0050	0.9748	0.2145	0.4012	0.3925
$\Delta\Pi^{effect}_{i,t+3}$	-0.0331	-0.0486	0.2177	0.1635	0.0688	0.1085	0.1993	**0.2492**
	0.8175	0.7350	0.1211	0.2517	0.6461	0.4679	0.1793	**0.0877***
$\Delta\Pi^{effect}_{i,t+4}$	**0.8112**	**0.2547**	**0.2667**	**0.8304**	-0.0637	-0.0456	0.0777	0.0818
	0.0000***	**0.0840***	**0.0669***	**0.0000*****	0.7123	0.7918	0.6526	0.6304
$\Delta\Pi^{effect}_{i,t+5}$	**0.3361**	0.2278	-0.0360	-0.0512	0.2903	0.1427	0.2360	0.1708
	0.0484**	0.1882	0.8374	0.7702	0.1197	0.4518	0.2094	0.3668

RIVALS

	PROCOMPETITIVE				**ANTICOMPETITIVE**			
	MV_CAR(2,2)	**MV_CAR(5,5)**	**MV_CAR(25,5)**	**MV_CAR(50,5)**	**MV_CAR(2,2)**	**MV_CAR(5,5)**	**MV_CAR(25,5)**	**MV_CAR(50,5)**
$\Delta\Pi^{effect}_{i,t+1}$	**0.3314**	0.0204	0.0085	0.1264	**-0.1174**	**-0.1455**	**0.1444**	**0.2191**
	0.0000***	0.7842	0.9090	0.0899	**0.0860***	**0.0334****	**0.0348****	**0.0013*****
$\Delta\Pi^{effect}_{i,t+2}$	-0.1222	0.0271	**-0.2188**	-0.0413	**-0.2211**	**-0.2676**	**0.3003**	**0.2045**
	0.1262	0.7365	**0.0059*****	0.6077	**0.0055*****	**0.0008*****	**0.0002*****	**0.0104*****
$\Delta\Pi^{effect}_{i,t+3}$	0.1216	-0.1338	0.0062	0.0402	-0.1353	0.0004	**0.2199**	0.1600
	0.1953	0.1541	0.9478	0.6724	0.1687	0.9971	**0.0242****	0.1029
$\Delta\Pi^{effect}_{i,t+4}$	**-0.2841**	**-0.2379**	-0.0742	-0.0837	-0.0598	0.1817	**0.4032**	0.1853
	0.0055*	**0.0210****	0.4770	0.4227	0.6029	0.1113	**0.0003*****	0.1043
$\Delta\Pi^{effect}_{i,t+5}$	-0.0355	**0.3037**	0.1482	-0.0266	**-0.4058**	**-0.3331**	**0.6128**	**0.2933**
	0.7656	**0.0090*****	0.2108	0.8234	**0.0007*****	**0.0059*****	**0.0000*****	**0.0160****

Notes: We report pair wise correlation coefficients (first row) as well as p-values (second row).***, **, * represent significance at the 1%, 5%, and 10% level respectively. A merger is defined to be anticompetitive (procompetitive) if the aggregated cumulative abnormal returns of the rivals - *MV_CAR(25,5)* - are positive (negative). The sample includes all observations for which the variable $\Delta\Pi^{effect}_{i,t+2}$ was not missing.

Table 5: Regression results

		Merging firms					
Dep. Vars:		**MV_CAR (5,5)**		**MV_CAR (25,5)**		**MV_CAR (50,5)**	
Sample	**Var**	**Coeff**	**t-value**	**Coeff**	**t-value**	**Coeff**	**t-value**
All	$\Delta\Pi^{effect}_{i,t+5}$	0.16	0.82	0.21	0.69	0.45	0.76
	$\Pi_{i,t-1}$	-0.14	-0.69	-0.10	-0.19	-0.67	-0.81
Procomp	$\Delta\Pi^{effect}_{i,t+5}$	0.31	1.02	0.16	0.44	0.32	0.59
	$\Pi_{i,t-1}$	-0.22	-0.63	-0.61	-1.25	-0.99 *	-1.81
Anticomp	$\Delta\Pi^{effect}_{i,t+5}$	0.04	0.17	0.59	0.99	0.80	0.67
	$\Pi_{i,t-1}$	-0.16	-0.64	0.23	0.26	-0.41	-0.30
		Rivals					
Dep. Vars:		**MV_CAR (5,5)**		**MV_CAR (25,5)**		**MV_CAR (50,5)**	
Sample	**Var**	**Coeff**	**t-value**	**Coeff**	**t-value**	**Coeff**	**t-value**
All	$\Delta\Pi^{effect}_{i,t+5}$	0.02	0.34	0.14	1.31	**0.71 *** **	3.41
	$\Pi_{i,t-1}$	-0.01	-0.12	-0.08	-0.76	-0.13	-0.55
Procomp	$\Delta\Pi^{effect}_{i,t+5}$	0.11	1.59	**0.21 *** **	2.55	0.03	0.07
	$\Pi_{i,t-1}$	-0.03	-0.45	-0.43 ***	-3.77	-0.41	-1.52
Anticomp	$\Delta\Pi^{effect}_{i,t+5}$	-0.09	-1.36	**0.15 ***	1.77	**1.05 *** **	3.09
	$\Pi_{i,t-1}$	0.06	1.01	0.18 **	2.06	-0.06	-0.15

Notes: We report the coefficients and t-values of regressions with MV_CARs in Mn. USD (various windows) as dependent variables and projected profit effects after five years ($\Delta\Pi^{effect}_{i,t+5}$), and lagged profits ($\Pi_{i,t-1}$) (both in Mn. USD) as explanatory variables for the subsamples listed in the table. The symbols ***, **, * represent significance at the 1%, 5%, and 10% level respectively. A merger is defined to be anticompetitive (procompetitive) if the aggregated cumulative abnormal returns of the rivals - *MV_CAR(25,5)* - are positive (negative).